

Project Proposal: Online Blockchain-Based Certificate Generation and Validation

1. Topic Name:

Online Blockchain-Based Certificate Generation and Validation

2. Brief Introduction:

In a world where documents and certificates are crucial for validating identities and achievements, the potential for document loss, tampering, or forgery has become a significant concern. Current centralized systems, such as DigiLocker, are susceptible to data breaches, creating a need for a more secure and efficient system. Blockchain technology, being decentralized and tamper-proof, offers an ideal solution to overcome these challenges, providing a secure platform for certificate generation and validation.

3. Objective of the Work:

The primary objective of this work is to design and implement a blockchain-based system for the generation and validation of certificates, mitigating the risks of forgery, loss, and delays in verification. The system aims to be decentralized, tamper-resistant, and transparent, offering an efficient way for issuers, users, and verifiers to interact.

4. Identification of Problem Statement:

Traditional paper-based certificates are prone to loss and forgery. Verifiers must often contact issuers to validate the authenticity of documents, leading to delays. Furthermore, centralized digital storage solutions, like DigiLocker, are vulnerable to data breaches, compromising the privacy and security of sensitive information. Thus, a decentralized and secure method is needed for certificate management and validation.

5. Review of Previous Work:

Previous research has demonstrated the potential of blockchain in certificate verification.

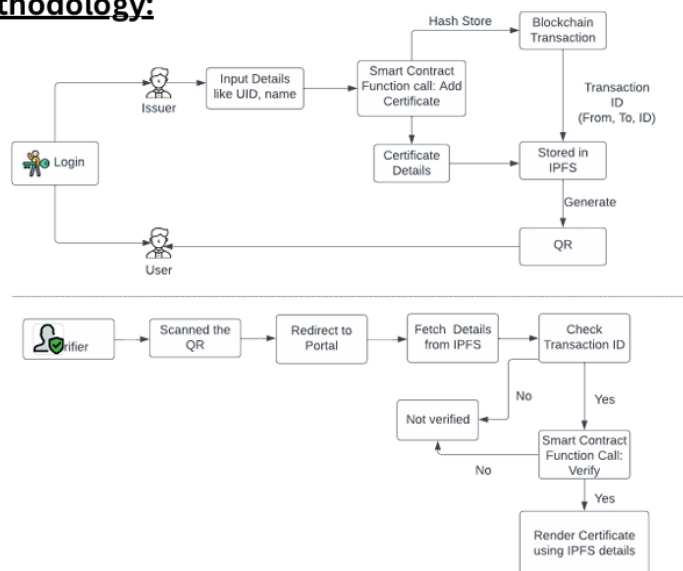
- *Zaman et al.* (2023) investigated the use of NFTs and blockchain for digital certificate security, but the high cost and potential disputes in NFT ownership posed challenges.
 - *Hargude et al.* (2021) implemented dynamic QR codes with blockchain for secure certificate verification, yet the system faced technical complexities and data accuracy concerns.
-

6. Methodology to Achieve the Objective:

- **Blockchain Network:** The project will utilize the Polygon network for its low transaction costs and scalability.

- **Decentralization & Storage:** IPFS (Inter Planetary File System) will be employed to store certificate data off-chain, while essential certificate details and verification information will be stored on the blockchain.
- **Smart Contracts:** Solidity will be used to create smart contracts for certificate issuance and validation.
- **Frontend & Interaction:** A user interface will be developed using React and Node.js, allowing issuers, holders, and verifiers to interact seamlessly.
- **Verification:** Dynamic QR codes will be generated for each certificate, allowing real-time verification through blockchain.
- **Security:** The system will ensure the tamper-proof nature of certificates through blockchain's inherent security features.

Proposed Methodology:



7. Tentative Solution:

The proposed solution will provide a decentralized platform for certificate generation and validation using blockchain technology. It will integrate **IPFS** for efficient storage, while ensuring that essential certificate data is immutable and securely stored on the blockchain. The use of **dynamic QR codes** will simplify the verification process, making it more reliable and accessible. The system will be scalable, cost-effective, and resistant to tampering or fraud, addressing the gaps in existing centralized certificate management systems (online blockchain based...).

8.Team Members:

- Rishabh Chandra Rao
- Sujit Kumar
- Aashi Kumari
- Vicky

